THE PLANT DISEASE REPORTER

Issued By

THE PLANT DISEASE SURVEY

Division of Mycology and Disease Survey

BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING

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The Plant Disease Reporter is issued as a service to plant pathologists throughout the United States. It contains reports, summaries, observations, and comments submitted voluntarily by qualified observers. These reports often are in the form of suggestions, queries, and opinions, frequently purely tentative, offered for consideration or discussion rather than as matters of established fact. In accepting and publishing this material the Division of Mycology and Disease Survey serves merely as an informational clearing house. It does not assume responsibility for the subject matter.

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THE PLANT DISEASE SURVEY
DIVISION OF MYCOLOGY AND DISEASE SURVEY

Plant Industry Station — Beltsville, Maryland
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PUBLICATION OF THE 1948 FUNGICIDE TEST SUMMATION

To plant pathologists in the United States, its territories, and in Canada. During 1945, 1946 and 1947, the American Phytopathological Society through its fungicide committees, undertook the task of collecting, classifying, summarizing and mimeographing disease-control data generously contributed by pathologists throughout the United States and Canada. This summary was based on the performance of the new fungicides used as soaks, dips, sprays, dusts, aerosols, fumigants or drenches for seeds, vegetation, bulbs, tubers, corms, roots, cuttings, or slips of different types of crops, or for disinfection of seed beds and field soils.

The 1948 summation will again be published as a Plant Disease Reporter Supplement. This has proven to be a satisfactory arrangement and has brought the report into wider circulation. We are asking again your generous support in making the 1948 report to you a finished product. Therefore, all workers who have obtained results on the performance of fungicides in 1948 are urged to participate in this new summary. The information sent in should include: Name and address of worker, crop diseases combatted, materials tested, along with the concentration or rate of application used, and the rating or relative efficiency of the different materials with regard to emergence, stand, disease control, injury, and yield.

To simplify the task for those who can cooperate, as well as for the committee in compiling the summary, report forms have been prepared and are being sent out to cooperators in various experiment stations throughout the United States and Canada. One sheet should be used for any one disease on any one crop. Additional forms can be obtained by writing to Paul R. Miller, Plant Industry Station, Beltsville, Maryland, to whom all completed forms are to be sent.

It should be emphasized that the inclusion of these preliminary comparative results in this summation will not in the least detract from the general interest in the worker's detailed data when he publishes them later but, on the contrary, should add to it. Each cooperator is in reality a coauthor of this summation report and, of course, will be given credit for his contribution to it.

The Committee: J. W. Heuberger, Chairman, E. E. Clayton, M. C. Goldsworthy, R. J. Haskell, R. W. Leukel, W. D. McClellan and Paul R. Miller.

TOBACCO DISEASES IN KENTUCKY IN 1948

W. D. Valleau and S. Diachun

Blue Mold [Peronospora tabacina]. The first report of blue mold was April 29 from Simpson County. By June 1 the disease was rather general over the State but caused very little injury except to shaded plants. Beds were sowed late, making a short period for the build-up of the disease. Many growers were prepared to use Fermate and other recommended materials but very little was used. The disease usually was of the flecking type, allowing growers to set affected plants without danger. The period of greatest spread was dry.

Wildfire [Pseudomonas tabacum]. When tobacco plants were about one-third grown there was a protracted wet period with very extensive development of wildfire and angular leaf spot [P. angulata] in untreated beds. It was the most extensive outbreak of wildfire over the State as a whole that has occured in over 30 years. Beds sprinkled twice with Bordeaux mixture for the most part remained free from infection, but some beds apparently treated at the proper time developed wildfire where water had flowed across the bed or where the bed had been weeded following the last treatment thus bringing contaminated roots and soil to the surface. Tobacco in fields set with diseased plants was severely injured during the summer from wildfire. Fields set with clean plants were generally free from wildfire although some field infection did occur; however, usually only on occasional plants. The loss from wildfire in many fields will amount to one-third of the crop.

Black Shank [Phytophthora sp.] has been reported this year from ten counties--Pendleton, Owen, Owsley, Bourbon, Franklin, Washington, Fayette, Marion, Nelson and Scott. Over a period of years it has been reported from 25 counties. In Washington County it destroyed two crops, one where the disease was present last year and the other where a seed bed was placed in an infested garden. In Bourbon a small crop was nearly entirely destroyed and in Scott a backyard planting in Georgetown was nearly a complete loss. In spite of the disease having been present in Georgetown for the past ten or fifteen years there is very little loss from black shank in the approximately 200 acres of backyard tobacco grown in the town. The fungus is spread by creek water over-flowing onto land later set with tobacco. In one instance in Scott County it appeared to have been introduced into a garden with dirt from a road ditch dumped on the garden the previous year. In some instances the disease has appeared in high land on farms with infested over-flow land, evidently carried on machinery or in other ways that would transport soil.

Fusarium Wilt [F. oxysporum f. nicotianae] is becoming very general over the State where a few years ago it was almost unknown. In question-

ing groups of farmers at the Experiment Station field day, about one-fifth of approximately 2000 present said they had an occasional diseased plant in their plantings. The disease was severe on burley tobacco in the extreme western counties of the State along the Mississippi River. A group of varieties resistant to mosaic, black root rot, and Fusarium wilt are being tested with farmers. They show a high degree of resistance to wilt but not immunity.

Black Root Rot [Thielaviopsis basicola]. With over 90 percent of the burley crop set with resistant varieties the losses from black root rot were very slight. However, with the practice of growing tobacco continuously on the same land and manuring, black root rot is causing a slight amount of injury to Ky 16 and Ky 41A, the two most popular root rot-resistant varieties. Yield is probably not reduced greatly but there is some delay in time of maturing. This affects a very small percentage of the crop but it is a warning that more resistant varieties are desirable. Ky 22 and Ky 56 and several other new varieties with a higher degree of resistance are being tested with farmers.

Mosaic [virus]. Mosaic is gradually being reduced by greater care in handling plants, and where the disease has been severe by the use of a resistant variety. Ky 52 and Ky 56 are being used for mosaic control in the burley fields. Ky 160 is rapidly becoming the most popular one-sucker variety, and Ky 151 is being grown in increasing amounts in the dark fire-cured areas.

Vein Banding (virus) was found in many plantings, probably because of the rather general infestation of aphids. Usually it was found that potatoes had been grown in the vicinity some time during the summer. Vein banding causes little if any injury to burley except that some of the new Fusarium-resistant varieties appear to develop a rather severe necrotic leaf spot disease following natural infection.

Ring Spot (virus) was more common than usual. In some plantings nearly 100 percent of the plants were affected around the edges of the fields. The loss was slight.

Club Root (virus) was reported from Gallatin, Owen, and Fayette Counties in Kentucky and specimens were brought to the laboratory from Brown County, Ohio. In two outbreaks in Owen County there was fairly conclusive evidence that club root originated in the plant bed, rather than in the field as the evidence in 1947 seemed to show. In three fields plants from one bed developed club root while plants from another bed in a different location remained free. In two of the beds from which affected plants were obtained root aphids were abundant and injurious but their presence and club root is considered a coincidence. The first pulling from a bed in which aphids were not known to be present produced only an occasional club root plant in the field, but a

second pulling set in another field resulted in a great many club root plants, whereas plants from another bed produced only healthy plants.

Streak (virus). In some of the North-Central counties streak was reported as being unusually severe. There was extensive spread in the middle of the summer and again the first week in September.

A disease that has been seen for several years on the Experiment Station grounds on an occasional plant has been reported this year as causing rather extensive injury in several fields, particularly in the new root rot-resistant burley Ky 24. Affected plants are characterized by having small very narrow leaves with the tips and the borders bent down. The leaves wilted somewhat in the middle of the day when other tobacco is turgid. The plants are sometimes nearly a total loss as they are crowded by neighboring plants. There are no symptoms besides wilting and the narrow hooked leaves by which the disease can be recognized.

A couple of years ago we grew a few small crops of Nicotiana rustica in several parts of the State. Usually after topping and suckering the plants developed a condition, very similar to the disease in burley, that was aptly called "fever" by one of those interested in the crop. The "fever" plants could be most easily recognized by their higher temperatures, in the heat of the day, than healthy plants, and on handling the leaves were found to be partially wilted. The plants slowly died. No other symptoms could be found on them. It seems likely that the disease on burley and that on N. rustica are the same.

KENTUCKY AGRICULTURAL EXPERIMENT STATION

BURLEY TOBACCO DISEASE SITUATION IN TENNESSEE - 1948

Howard E. Heggestad

A severe outbreak of wildfire (Pseudomonas tabacum) was observed this year in East Tennessee. This development has been associated with increased prevalence of the disease in recent years. In 1948, it is estimated that wildfire was present in approximately 75 percent of the burley tobacco fields. Infection ranged from very slight in some fields to severe and nearly total destruction of the crop in other fields. Severe stunting of wildfire infected plants was noticed in the heavily infected fields. Some loss of seedlings due to wildfire was also observed in several plant beds in the spring. Considering both damage to seedlings and the severe losses in the field, wildfire was the most important disease present in this burley tobacco producing area.

Rapid wildfire development in August of this year followed a period of extremely heavy rainfall. Weather records at the Tobacco Experiment Station, Greeneville, showed precipitation of 0.81, 1.29, 0.20, 1.07, and 1.14 for July 28, August 1, 2, 3, and 4, respectively. During the second week of August, wildfire and, also frenching were unusually prevalent. The heavy rainfall and waterlogged soil apparently favored development of frenching. Both wildfire and frenching were present in many fields resulting in total loss of harvestable tobacco in small areas of a few fields. From mid-August until nearly mid-September, dry weather prevailed. This checked further damage and spread of the above diseases and permitted harvesting most of the crop.

Comparatively few growers used the Bordeaux plant bed treatments for wildfire control, and many of these delayed applications until wildfire was already present in the beds.

Blue mold, Peronospora tabacina, caused only minor damage in plant beds this season. The disease was first observed both in 1947 and 1948 in old plant bed sites. This year the disease was first reported on April 28. Because of extremely dry warm weather between May 8 and May 26, the normal transplanting season, very little loss of plants occurred even in untreated beds. Approximately 25 percent of the growers attempted some control of the disease. Fermate spray was used by most of these growers.

Black shank, Phytophthora parasitica var. nicotianae, was observed on burley tobacco on one farm in Williamson County, Middle Tennessee.

Root knot, Heterodera marioni, was noted late in the season in many fields. In some cases excessive firing of lower leaves was associated with the presence of galls on the roots. Severe stunting of plants was observed in a few fields.

Damage due to frogeye and brown spot, leafspots caused by Cercospora nicotianae and Alternaria longipes respectively, was prevalent on the late tobacco. Dry, windy weather hastened firing of lower leaves during the latter part of the season. Brown spot developed rapidly on these fired leaves during wet weather between September 6 and 15. Frogeye was also abundant on the bottom leaves. The disease spread to the top of the plants in many crops before harvest. This late development of frogeye has resulted in numerous dark green spots on cured leaves of the late tobacco. Green spot results from frogeye lesions that are immature at the time the tobacco is harvested.

U. S. DEPARTMENT OF AGRICULTURE AND TENNESSEE EXPERIMENT STATION

OCCURRENCE OF TOMATO SPOTTED WILT IN NEBRASKA IN 1948

A. F. Sherf

During the past six years tomato growers in the vicinity of Lincoln, Nebraska, have experienced considerable loss from virus diseases including tobacco mosaic, cucumber mosaic, double-virus streak, and spotted wilt. The severity of virus diseases this year in the Lincoln area was most likely related to the unusually heavy influx of peach and bean aphids and thrips which persisted for a period of several weeks.

Initial symptoms of spotted wilt included a marked stunting of the plant, a bright bronzing of the top leaflets and the presence of tiny necrotic interveinal spots or patches. Fruit formed before the plant died exhibited ringed areas ranging from 10 to 20 mm. in diameter inside of which was normal green or red tissue. Ripe fruit became a faded yellowish pink with prominent yellow rings. Such fruit was of extremely poor quality. Fruit symptoms clearly differentiate this disease from ring spot as described by Samson and Imle (1942). Leaves of healthy Turkish tobacco (Nicotiana tabacum L.) when rubbed with carborundum and juice from diseased tomato plants exhibited local lesions in 4 days.

In 1948, spotted wilt first became evident during the week of June 27 and within seven days in many fields, 30 to 40 percent of the plants exhibited symptoms. These plants most likely became infected during the period of early heavy insect infestation. In fields in which such diseased plants were rogued, within the following month another 20 to 30 percent of the plants developed spotted wilt, apparently from current season spread from the early plants. No varietal differences in susceptibility were noted. Pearl Harbor, which is considered resistant to the western strain of this virus, developed considerable infection.

Spotted wilt in 1948 has been limited to Lincoln and its suburbs. Surveys of fields in Douglas, Otoe, Buffalo, and Scotts Bluff Counties have failed to indicate the presence of the disease. In addition, specimens of diseased tomatoes submitted from all other parts of the State have never been identified as spotted wilt.

The source of primary infection is not known definitely; however, certain weeds and ornamentals are suspected as overwintering hosts. In one 20-acre field in which 50 to 60 percent of the plants developed spotted wilt, the most severely infected areas were adjacent to small patches of field bindweed (Convolvulus arvensis) which had not been completely eradicated. The leaves of the bindweed in these areas exhibited a yellow mottle. Juice from such mottled bindweed leaves when rubbed on Turkish tobacco caused rings typical of spotted wilt to appear within seven days. Thus, field bindweed is considered to be of importance as a weed host of the virus.

UNIVERSITY OF NEBRASKA

RELATIVE SUSCEPTIBILITY OF CERTAIN PEACH STOCKS TO RACES OF THE ROOT-KNOT NEMATODE

J. R. Christie and Leon Havis[1]

During recent years it has become more and more evident that even such peach stocks as Yunnan and Shalil are sometimes severely attacked by root-knot nematodes. The tests reported here were designed to determine the relative susceptibility of several peach varieties or selections to certain "races" of the root-knot nematode. The tests were conducted in greenhouses at the Plant Industry Station, Beltsville Maryland, during the springs of 1945 and 1947. Several possible peach rootstocks that had shown some degree of root-knot nematode resistance were tested along with the "resistant" varieties, Yunnan and Shalil, and a "susceptible" variety, Elberta. Since Long and Whitehouse[2] found most of the numbered selections used here to be resistant to the nematodes at Chico, California, they were included in these tests. These are introductions from China and India by the Division of Plant Exploration and Introduction.

Procedure

For the 1945 experiment the peach seeds were germinated in 4-inch pots, one seed to a pot, and when the seedlings had reached a suitable size they were transplanted into 6-inch pots containing nematode-infested soil. Five Elberta seedlings and five Yunnan seedlings were used for each population of the root-knot nematode. For the 1947 experiment the seeds were germinated in flats and the seedlings transplanted, first into 4-inch pots and then, after an interval of about two weeks, into 6-inch pots containing nematode-infested soil. The number of seedlings of each peach selection used for each population of the root-knot nematode is shown in table 2.

Pending the publication of descriptions of the different types of root-knot nematodes, the term "population" is used in this manuscript, and populations from different sources are identified by numbers.

The original inoculum for each population of the root-knot nematode was obtained from infected roots collected from an individual plant or from

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[1] The authors appreciate the cooperation of J. E. Joley, U. S. Plant Introduction Garden, Chico, California, and J. H. Weinberger, U. S. Horticultural Laboratory, Fort Valley, Georgia, in furnishing some of the material for these tests.

[2] Long, J. C., and W. E. Whitehouse. Variations in root-knot nematode infection of various lines of peach progenies at Chico, California. Amer. Soc. Hort. Sci. Proc. 43: 119-123. 1943.

Table 1. Origin of the root-knot nematode populations

Pop. No.	Host	General locality where collected
11A	Peach, variety Yunnan	Tifton, Georgia
11B	" roots from ordinary understock.	Tifton, Georgia
11C	" variety Yunnan	Fort Valley, Georgia
11D	" roots from ordinary understock.	Fort Valley, Georgia
12	Tobacco	Tifton, Georgia
2	Cotton	Shafter, California
9	Sugarcane	Clewiston, Florida
1B	Alfalfa	Klamath Falls, Oregon
3F	Potato	Knoxville, Tennessee
6	Sweetpotato	Beltsville, Maryland
13	Lespedeza	Tifton, Georgia

Table 2. Number of peach seedlings of each selection exposed to each root-knot nematode population. Experiment of 1947.

	11A	11B	11C	11D	12	2	9	Total
Shalil	20	20	20	20	20	20	14	134
Prunus davidiana (C-26712)	10	10	10	8				38
P. I. 55886 (Yunnan)	3	3	3					9
P. I. 146130 (Chico No. 11)	10	10	10	5				35
P. I. 146131 (Chico No. 12)	3	3	3	3				12
P. I. 146132 (Chico No. 13)	6	6	6	5				23
P. I. 146133 (Chico No. 14)	10	10	10	10	8	8		56
P. I. 146134 (Chico No. 15)	10	10	10	10				40
P.I. 146135 (Chico No. 16)	6	6	6	6				24
P. I. 146136 (Chico No. 17)	8	8	8	8				32

several plants of the same kind growing together in the same location. This inoculum was used to establish an infection on some suitable host plant, usually tomato. After a plant thus infected had been growing in the greenhouse for several months, inoculum was secured from it with which to establish an infection on another plant, the inoculum, in this instance, consisting of a single egg mass. The resulting population may be referred to, for convenience, as a single-egg-mass isolate, all the individuals having been derived from the progeny of one female. Each of the root-knot-nematode populations used to inoculate the peach seedlings was a single-egg-mass isolate. The origin of the different populations is given in Table 1.

In the 1945 experiment the peach seedlings were transplanted into infested soil on March 12 and removed for examination two months later. In the 1947 experiment the seedlings were transplanted into infested soil April 2 to 11 and removed for examination about three months later. Each seedling was knocked from the pot, the soil washed away from the roots, and the entire root system submerged in water in a white enamel tray for examination with the naked eye and with a hand lens. A portion of the root system was then clipped off, boiled in a mixture of lactic acid, phenol, and glycerine to which Sudan III had been added, and examined under a dissecting microscope. Root samples were taken for each peach selection exposed to each nematode population. The roots selected for the sample were from among those that appeared to be the most heavily infected.

Only part of the seedlings of Prunus davidiana (C-26712) were examined at the time and in the manner indicated above. The remainder were knocked from the pots and set in the open field without disturbing the roots. There they were allowed to grow until December 4, when they were dug and examined while in a dormant condition. This procedure was followed in order that a portion of the seedlings could be saved and grown for further observation. The number treated in this manner is indicated in Table 4.

Results

For all the peach selections tested, except Prunus davidiana (C-26712), the roots of all the seedlings that were exposed to a given nematode population showed about the same degree of infection, making it unnecessary to give data on individual seedlings. The results given in Table 3, for both the 1945 and 1947 experiments, are average ratings for all the seedlings of a given selection exposed to a given root-knot nematode population. On the other hand, P. davidiana showed considerable difference in the degree to which individual seedlings became infected with a given nematode population, and results with this species are shown in Table 4.

Seedlings of the variety Elberta were fairly resistant to population 1B, somewhat resistant to population 6, and susceptible to all the others.

Table 3. Degree to which different populations of the root-knot nematode infected different selections of peach seedlings. Results based primarily on galling. 1945 and 1947 experiments combined.

	11A	11B	11C	11D	12	2	9	1B	3F	6	13
Elberta	3[a]	4	3	4	3	4	3	1	4	2	4
Yunnan	4	1	4	1	4	2	2	0	0	0	0
Shalil	3	0	4	1	4	2	4	--	--	--	--
Prunus davidiana (C-26712)	(See table 4)										
146130 (Chico No. 11)	4	0	3	0	--	--	--	--	--	--	--
146131 (Chico No. 12)	4	0	4	0	--	--	--	--	--	--	--
146132 (Chico No. 13)	4	0	4	0	--	--	--	--	--	--	--
146133 (Chico No. 14)	4	0	4	0	3	3	--	--	--	--	--
146134 (Chico No. 15)	3	0	3	0	--	--	--	--	--	--	--
146135 (Chico No. 16)	3	1	3	1	--	--	--	--	--	--	--
146136 (Chico No. 17)	4	0	3	0	--	--	--	--	--	--	--

Table 4. Effect of different populations of the root-knot nematode on seedlings of Prunus davidiana.

Nematode population	Number of seedlings showing infection: None	Trace	Light	Moderate	Severe
11A	2(6)[a]	(2)	0	0	0
11B	(1)	1(1)	1(1)	(3)	1(1)
11C	1(3)	2(2)	2	0	0
11D	1(2)	2(2)	(1)	0	0

[a] Figures in parentheses indicate seedlings examined March 4, 1947, as explained in text.

Seedlings of the variety Yunnan were susceptible to 11A, 11C, and 12, slightly susceptible to 2 and 9, and resistant to all the others. Most of the peach selections included in the 1947 experiment were tested against only four populations (11A, 11B, 11C, and 11D), and all, with the exception of P. davidiana, behaved in the same manner as Yunnan, being susceptible to 11A and 11C and resistant to 11B and 11D. On the other hand, P. davidiana was somewhat more susceptible to population 11B than to 11A, although about equally susceptible to 11C and 11D. Only two of the ten seedlings exposed to 11A showed evidence of infection, and these two very slightly, whereas, all except one of the ten seedlings exposed to 11B became infected, two very severely.

DIVISION OF NEMATOLOGY, AND DIVISION OF FRUIT AND VEGETABLE CROPS AND DISEASES, BUREAU OF PLANT INDUSTRY, SOILS, AND AGRICULTURAL ENGINEERING, AGRICULTURAL RESEARCH ADMINISTRATION, U. S. DEPARTMENT OF AGRICULTURE

OBSERVATIONS ON THE USE OF LIME-SULFUR SPRAYS ON PEACH IN MARYLAND, 1948

L. O. Weaver

A large percentage of the Maryland commercial peach acreage received one, two or more pre-harvest sprays of either 2 or 3 quarts liquid lime-sulfur in 100 gallons of spray. The recommended method of application was generally followed by the growers, who used speed sprayers or orchard guns with fine discs.

Blossom blight infection in April was general over the State. It was serious in a few orchards. Dead blossoms and twig cankers were easily found during the summer months and fructifications of Monilinia fructicola were collected from these cankers throughout the peach season. Also, unfertilized fruits or "buttons" became infected early in the summer and served to build up a high spore potential for the harvest period. The situation was one in which fruit rot would be difficult to control in wet or humid weather.

A trace of blossom blight was present in peach research plots at Hancock, under supervision of Dr. C. Graham. Three rows of 5-year-old Elberta trees received liquid lime-sulfur in all sprays. A concentration of 2 quarts in 100 gallons was used. On the other rows in the plot, wettable sulfur 6-100 and 85-15 sulfur dusts were used, followed by lime-sulfur as a pre-picking spray. Sprays and spray dates were as follows: Pre-blossom, April 7 (Lime-sulfur 1 1/2 gal.-100), Petal-fall, April 16, Shuck, May 6, First Cover, May 17, Second Cover, May 25, Pre-harvest sprays July 9, July 23, August 9 and August 21.

Table 1. Peach scab and post-harvest brown rot control from sulfur fungicides.

Treatment	Peach Scab Percent	Brown Rot on Fruit College Park Percent	Brown Rot on Fruit Hancock Percent
Lime-sulfur 2 quarts-100 for all sprays	21	38	23
Wettable sulfur 6-100 2 quarts LS pre-harvest	0	12	11
Sulfur dusts 85-15 2 quarts LS pre-harvest	1	21	--

On August 23, only the lime-sulfur rows had a trace of fruit rot. Peach scab [Cladosporium carpophilum] was present as shown in Table 1. Firm ripe fruit for shipment was held at College Park and Hancock to simulate marketing conditions. The records of fruit rot were made August 28, 1948. At harvest, there was no visible spray injury to foliage or fruit on these vigorous trees.

Lime-sulfur at 2 quarts in 100 gallons is a weak fungicide. When applied throughout the season, it did not prevent peach scab infection as did sulfur dusts and wettable sulfur sprays. Peaches from lime-sulfur sprayed rows held at room temperature for 5 days rotted to a greater degree than from other sulfur treatments. Of course-lime-sulfur was suggested only as a pre-harvest fungicide. However, peaches from the other sulfur treatments sprayed with lime-sulfur, 2 quarts in 100 gallons four days prior to picking developed 12 to 21 percent rot after being held for a 5-day period.

The growers in the Washington County peach area suffered negligible losses from brown rot at harvest. Dry weather in August and harvesting of firm fruit for shipment were important factors in its control.

Table 2. Precipitation records in inches of rainfall for Western and Eastern Maryland during Halehaven harvest.

	Hancock	Baltimore	Salisbury
July 30	.00	.00	.00
July 31	.04	.31	.00
August 1	.47	2.44	1.38
August 2	.00	T	.85
August 3	.00	.10	.16
August 4	.00	1.12	4.20
August 5	.45	.02	.50
August 6	.00	.00	.50

Weather conditions were not as favorable in the orchards of the eastern counties of Maryland and the Eastern Shore at time of harvest of mid-season and late varieties. Rainfall and continued high relative humidity from July 30 to August 5 favored fruit rot. (Table 2). In one orchard, a large block of Halehaven was 100 percent loss. Cankers formed which killed much of the terminal growth. Orchardists on the Eastern Shore estimate their losses of mid-season and late peach varieties at 40 percent. Under such adverse weather conditions, all sprays including lime-sulfur failed to protect the crop.

Although there was no visible foliage injury in the Hancock plots, other orchards under observation showed considerable shot-hole and mar-

ginal burning of leaves. This was most noticeable on lower limbs and especially where the trees were close together. The injury is attributed partly to mechanical pressure from spray guns.

In summary, from observations in 1948, lime-sulfur at 2 or 3 quarts to 100 gallons is not as effective as wettable sulfur or sulfur dusts for protecting peaches prior to harvest. Pre-harvest applications of lime-sulfur on peaches which were picked under ideal weather conditions failed to prevent post-harvest brown rot. Peaches, on Eastern Shore, pre-harvest sprayed with lime-sulfur rotted severely under extremely adverse weather conditions. Also, there is a possibility of considerable foliage injury from this spray.

Many peach growers favor lime-sulfur because it is cheap, easy to handle and does not leave a spotty or noticeable residue. When blossom blight remnants and cankers are present in an orchard, lime-sulfur, 1/2 gallon in 100, is a risky fungicide for fruit rot especially if humid or showery weather prevails at harvest. It may be applied successfully for better appearance and less residue where the orchard is free of blossom blight cankers and free from mummied or insect injured fruit.

From these observations in Maryland, 1948, it is evident that lime-sulfur did not prove to be as successful for post-harvest brown rot control as reported by Burkholder and Sharvelle[1] under their conditions.

UNIVERSITY OF MARYLAND, COLLEGE PARK

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[1] Brown rot in orchard, storageand transit. C. L. Burkholder and E. G. Sharvelle. The 1948 Peach Annual of National Peach Council

SOME UNUSUAL RECORDS OF PLANT DISEASES

ONION SMUDGE IN WASHINGTON

By Seth Barton Locke

Colletotrichum circinans (Berk.) Vogl., the fungus associated with onion smudge, is known to be widely distributed in the United States east of the Rocky Mountains. It was pointed out more than a quarter of a century ago that this fungus was probably of wider distribution than the reports indicated[2]. Nevertheless, to the writer's knowledge, onion smudge has not been reported from the Pacific Coast States. Snyder reported in 1943 that smudge had not been observed on onions of any kind grown in California and suggested that this might be attributed to climatic conditions which were unfavorable for its development[1]. Records of the Plant Pathology Department of Washington State College, dating from 1915, contain no record of onion smudge occurring in Washington.

In view of the unrestricted shipment of bulbs and sets into the State from areas where smudge commonly occurs, it seems highly improbable that the fungus has not, at one time or another, been introduced. It seems, rather, that climatic factors are the ones which limit the appearance of the disease in this area. This is borne out by the appearance of onion smudge in the vicinity of Pullman, Washington, during the past season. Ordinarily, no difficulty is experienced in this area in harvesting and curing onions under conditions unfavorable for infection. This year two instances were noted where the onions, grown from sets, were left in the ground until after the first fall rains had occurred. White varieties so handled were found upon digging to be infected with the smudge fungus, which was fruiting abundantly on the outer scales. Colored varieties growing at the same locations and handled in the same way showed no visible indications of infection. White varieties dug before the rains likewise were not infected.

STATE COLLEGE OF WASHINGTON, PULLMAN

A RING SPOT VIRUS DISEASE OF PEPPER IN MASSACHUSETTS

By O. C. Boyd

Specimens of what appears to be the tobacco etch virus on pepper leaves were collected September. Over 50 percent of the plants in a field in

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1 Snyder, W. C. Smudge and other fungus blemishes on onion sets imported into California. Plant Disease Reporter 27: 645-647. 1943.

2 Walker, J. C. Onion smudge. Jour. Agr. Res. 20: 685-722. 1921.

Deerfield showed the disease, which affected the fruits similarly. The plants were raised in a bed adjacent to the grower's tobacco bed, both having grassland and weeds adjacent. I should say at least a quarter of the fruit crop was worthless because of the virus lesions and the overall yield was cut heavily due to effect of the virus on the plants.

MASSACHUSETTS STATE COLLEGE, AMHERST

CHECK LIST REVISION

Freeman Weiss

PONTEDERIACEAE

HETERANTHERA

HETERANTHERA DUBIA (Jacq.) MacM., MUD-PLANTAIN. Perennial herb of fresh-water ponds and streams, widely distributed in the U. S.; a wildlife food plant.

Membranosorus heterantherae Ostenfeld & Petersen, root hypertrophy. N. Y., Vt.

PONTEDERIA (PONTEDERIACEAE)

PONTEDERIA CORDATA L., PICKEREL-WEED. Aquatic herb of shallow ponds and streams in the Central and Eastern States and southward; a wildlife food plant.

Cercospora pontederiae Ell. & Dearn., leaf spot. Tex., Wis.
Mycosphaerella pontederiae (Pk.) House, leaf spot. N. Y., Va.
Uromyces pontederiae Gerard (II,III), rust. Del., Fla., Ga., Mo., N. Y., N. Car., Pa., Va. O and I unknown.

PORTULACACEAE

CLAYTONIA

CLAYTONIA spp., SPRING BEAUTY. Mostly small woodland perennials as C. CAROLINIANA Michx. (1) and C. VIRGINICA L. (2) of the Eastern and Central States; C. MEGARRHIZA (A.Gray) Parry (3) of the far West; other spp. (4); used in rock and wild gardens.

Peronospora claytoniae Farl., downy mildew. Iowa, Md. (2); Calif., Wash. (4).
Physoderma claytoniana Greene, leaf gall. Mich., Wis. (3)
Puccinia mariae-wilsoni G.W.Clint. (0,I,III), rust. N. H., N. Y., Vt. (1); N. H. to Va., Mo., and Wis. (2); Colo. (3); Utah, Wash., Alaska (4).
P. agnita Arth. (0,III). Colo. (3). Correlated with the preceding.
Uromyces claytoniae Cke. & Pk. (0,I,III), rust. N. Y. (1).

POTAMOGETONACEAE

POTAMOGETON

POTAMOGETON spp., PONDWEED. Numerous aquatic herbs of fresh-water lakes and streams throughout temperate N. America; important food plants for wildlife.

Doassansia martianoffiana (Thuem.) Schroet., leaf smut. Frequent on P. natans L., and other spp., from Mass. to N. Car., Ill., and Wis.; also Wash.
D. occulta (Hoffm.) Cornu, seed smut. Conn., Md., N. Y., on P. epihydrus Raf.; on other spp. in Calif., Ill., Kans. The var. farlowii (Cornu) Setch. is reported in Vt. and northward.
Lagenidium muenscheri Cutter, root hypertrophy. On P. spirillus Tuckerm., N. Y.
Ramularia aquatilis Pk., leaf spot. On P. americanus Cham. & Schlecht., Kans., N. Y.
Rhizoctonia solani Kuehn, stem rot. On P. pectinatus L. and P. perfoliatus L. in salt-water bays of N. Car. and Va.

PRIMULACEAE

ANAGALLIS

ANAGALLIS ARVENSIS L., SCARLET PIMPERNEL. Annual herb of Europe, widely naturalized in America; a weed in cultivated ground but useful to wildlife.

Heterodera marioni (Cornu) Goodey, root knot. Hawaii.
Septoria anagallidis Ell. & Halst., leaf spot. N. J.

Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.), Calif.

ANDROSACE (PRIMULACEAE)

ANDROSACE OCCIDENTALIS Pursh (1), other spp. (2). ROCK-JASMINE. Small, mostly perennial herbs of the North Central and Western States, or introduced from Europe; some are grown in rock-gardens.

Mycosphaerella primulae (Auers. & Heufl.) Schroet., leaf spot. N. Mex. (2).
Peronospora candida Fckl., downy mildew. Kans. (1)
Puccinia volkartiana E.Fisch. (III), rust. Alaska.

LEWISIA (PORTULACACEAE)

LEWISIA REDIVIVA Pursh, BITTERROOT (1); other spp. (2). Perennial herbs of the northern Rocky Mountain and Pacific States; sometimes grown in rock gardens.

Uromyces unitus Pk. (I,III), rust. Calif., Mont. (1); Calif., Wash. (2)

MONTIA (PORTULACACEAE)

MONTIA LINEARIS (Dougl.) Greene, INDIAN-LETTUCE. Small annual herb of wet meadows in the Pacific Northwest, useful to wildlife.

Ustilago claytoniae Shear, seed smut. Wash.

PORTULACA (PORTULACACEAE)

PORTULACA GRANDIFLORA Hook, ROSE-MOSS (1). Annual herb of Brazil, widely grown for ornament. P. OLERACEA L., PURSLANE (2). Cosmopolitan weed, one variety of which is sometimes grown for greens.

Albugo portulacae (DC.) O.Kuntze, downy mildew. Me. to Ga., Tex. and Mont. (2).
Heterodera marioni (Cornu) Goodey, root knot. Ala.
H. schachtii A. Schmidt, on roots. Colo., Utah (2).
Rhizoctonia solani Kuehn, damping off. Ill. (1)

Curly top -- virus (Chlorogenus callistephi Holmes, Beta virus 1 K.M.Sm.). Calif. (1)

SPRAGUEA (PORTULACACEAE)

SPRAGUEA MULTICEPS Howell and S. UMBELLATA Torr., PUSSY-PAWS. Perennial herbs of the Pacific States and Northwest, sometimes grown in rock gardens.

Uromyces spragueae Harkn. (I,III), rust. Calif., Ore., Wyo.

CYCLAMEN (PRIMULACEAE)

CYCLAMEN INDICUM L., FLORISTS' CYCLAMEN (1), other spp. (2). Tuberous rooted or cormous herbs of the Mediterranean region, (1) widely grown as a florists' plant, others in outdoor gardens.

Aphelenchoides fragariae (Ritz.-Bos) Christie, leaf nematode.
Botrytis cinerea Pers. ex Fr., gray-mold bud & leaf rot. Cosmopolitan. Petal spot, Calif.
Cladosporium cyclaminis Massey & Tilford (nomen nudum), stunt (spot necrosis of tubers and leaves). Calif., Ill., N. J., N. Y., Ohio, Pa.
Colletotrichum cyclamenae Halst. See Glomerella cingulata
Erwinia carotovora (L.R.Jones) Holland, tuber rot. Ohio, ? N. J., N. Y.
Fusarium sp. (? F. oxysporum Schlecht.), wilt. N. J.
Gloeosporium cyclaminis Sibilia. See Glomerella cingulata
Glomerella cingulata (Ston.) Spauld. & Schrenk, leaf & bud blight. Reported variously as Colletotrichum, Gloeosporium, Glomerella rufomaculans Spauld. & Schrenk var. cyclaminis Patterson & Charles, but probably this. Ind., Mass., Mo., N. J., Ohio, Pa., Va.
Heterodera marioni (Cornu) Goodey, root knot. Cosmopolitan
Phyllosticta sp., leaf spot. N. J. P. cyclaminicola Trel. Ill., Ohio. P. cyclaminis Brun., Va. The latter name has priority and may include the former, perhaps also Phoma cyclamenae Halst.
Pratylenchus pratensis (De Man) Filip., meadow nematode (in roots). Va.
Ramularia cyclaminicola Trel., leaf spot, white mold. Calif., Ill., Minn., Ohio.
Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Conn.

DODECATHEON (PRIMULACEAE)

DODECATHEON spp., SHOOTING STAR, as D. MEADIA L. (1), D. VULGARE (Hook.) Piper (2), other spp. (3). Small perennial herbs, mostly of alpine habitats in the Western States; a few, including (1), in the Central States and eastward. Several are of ornamental value, especially (1), and are grown in rock and wild gardens.

Heterosporium sp., leaf spot. Alaska (3)
Phyllosticta dodecathei Trel., leaf spot. Wis. (1)
Puccinia melanconioides Ell. & Harkn. (0,I,III), rust. Calif., Ore. (3)
P. ortonii Jacks. (0,I,II,III). Calif., Ore., S. Dak., Utah, Wash., Alaska (3).
P. solheimii Cumm. (III). Wyo. (2)

DODECATHEON (cont.)
Uromyces acuminatus Arth. var. steironematis (Arth.) J.J.Davis (O, I), rust. Nebr. (1), N. Dak. (3). II and III on Spartina spp.

GLAUX (PRIMULACEAE)

GLAUX MARITIMA L. SEA-MILKWORT. Perennial herb of salt marshes on the north Atlantic coast, also on saline soil in the West; useful to wildlife.

Ascochyta sp., leaf spot. Alaska
Puccinia distichlidis Ell. & Ev. (O,I), rust. Mont., Wyo. II and III on Spartina spp.

LYSIMACHIA (PRIMULACEAE)

LYSIMACHIA spp., LOOSESTRIFE, as L. NUMMULARIA L., MONEYWORT (1); L. TERRESTRIS (L.) B.S.P., SWAMP-CANDLE (2); L. THYRSIFLORA L., WATER L. (3); L. VULGARIS L., GOLDEN L. (4); others (5). Perennial herbs of moist ground or swamps, except (4), native (2, 3) or naturalized from Europe (1,4), mostly in the Eastern and Central States; some are grown for ornament or are useful to wildlife.

Cercospora lysimachiae Ell. & Halst., leaf spot. N.J. (2)
Cladosporium lysimachiae Guba, leaf spot. Mass. (4).
Coleosporium campanulae (Pers.) Lév. (II,III), rust. Tenn. (5). O and I on Pinus resinosa.
Heterodera marioni (Cornu) Goodey, root knot. Tex. (1)
Pleosphaerulina hyalina Berl., on leaves. Va. (1).
Puccinia limosae Magn. (O,I), rust. Mass. to N. Car. and Mich. (2); Ill., Mass., Nebr., N. Y., Wis. (3); also on other spp. in this range.
Ramularia lysimachiae Thuem., leaf spot. Wis. (2,3).
Sclerotium delphinii Welch, stem rot. Kans. (1)
Septoria conspicua Ell. & Martin, leaf spot. Iowa, N. Y., Vt. (5).
Synchytrium aureum Schroet., leaf gall. Wis. (2)

PRIMULA (PRIMULACEAE)

PRIMULA spp., PRIMROSE. A. Florist's primulas, as P. MALACOIDES Franch. (1), P. OBCONICA Hance (2), and P. SINENSIS Lindl. (3); perennial herbs of China grown under glass as flowering pot plants. B. Garden primulas, especially P. ELATIOR Hill (4), P. VULGARIS Huds. (5), and P. POLYANTHA Mill. (6), others (7); perennial herbs mostly of Europe and w. Asia, grown in the open.

PRIMULA cont.

C. Native spp. (6) of western U. S., sometimes grown in rock gardens.

Alternaria sp., stem rot. Conn. (7)
Ascochyta primulae Trail, leaf spot. ? Wis. (4).
Asteroma garrettianum Syd., black leaf spot. Colo., Utah (8)
Botrytis cinerea Pers. ex Fr., gray-mold blight. Frequent in greenhouse and indoor culture (2,3), occasional in the open (4,6,7).
Cercosporella primulae Allesch., leaf spot. Wash. (4).
Colletotrichum primulae Halst., leaf spot. Fla. (?6)
Ditylenchus dipsaci (Kuehn) Filip., leaf & stem nematode. Md., Pa. (2,3).
Erysiphe polygoni DC., powdery mildew. Conn. (5); N. J., Va. (6)
Hendersonia foliorum Fckl., on leaves. N. Mex. (8)
Heterodera marioni (Cornu) Goodey, root knot. Occasional in greenhouse culture (2,3)
Mycosphaerella sp., leaf spot. Ariz. (8)
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (2)
Pseudomonas primulae (Ark & Gardner) Burkh., bacterial leaf spot. Calif. (6,7)
Puccinia aristidae Tracy (O,I), rust. Me.
Pythium irregulare Buism., root rot. Calif. (2)
Ramularia primulae Thuem., leaf spot. Calif. (3); Del. (4); Conn., N. Y. (6).
Rhizoctonia solani Kuehn, root rot. Ill. (1); Fla., Tex.
Uromyces apiosporus Hazsl. (III), rust. Calif., Nev. (8).

Mosaic -- virus. In part, Marmor primulae Holmes, identified in Calif. on (2), experimentally transmitted to (1) and (3); in part unidentified, as reported in Ind., Mich., ? N. J., Pa. (2). Cucumber mosaic virus (M. cucumeris Holmes, Cucumis virus 1 K.M.Sm.) causes a similar but not identical disease.
Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Calif. (2,6)
Yellows -- virus (Chloropsenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (6)

Chlorosis -- physiological, attributed to excessive soil acidity or to mineral deficiency as iron and magnesium. Occasional in greenhouse culture (2)

STEIRONEMA (PRIMULACEAE)

STEIRONEMA CILIATUM (L.) Raf., FRINGED LOOSESTRIFE (1); Perennial herb of wide distribution in the U. S., sometimes grown in wild gardens and useful to wildlife. Other spp. (2)

STEIRONEMA cont.

Cylindrosporium steironematis Atk., leaf spot. N. Y. (1).
Mycosphaerella sp. (Sphaerella ciliata Ell. & Ev.), leaf spot. N. Y. (1)
Pezizella oenotherae (Cke. & Ell.) Sacc., on stems and leaves. Va., Wis. (1)
Phyllosticta lysimachiae Allesch., leaf spot. N. Y. (1).
P. steironematis Dearn. & House. N. Y., Pa., Wis. (1).
Puccinia dayi G.W.Clint. (III), rust. N. Y. to W. Va., Ill. and Mont. (1); Mich., Wis. (2)
P. distichlidis Ell. & Ev. (0,I). Colo., N. Dak. (1). II and III on Spartina spp.
Ramularia lysimachiae Thuem., leaf spot. N. Car. (1); Wis. (1,2)
Septoria conspicua Ell. & Mart., leaf spot. Me. to Miss., Colo., and Wis. (1); Ill., Iowa, N. Dak., Wis. (2).
S. lysimachiae West. Mich., N. Y. (1).
Uromyces acuminatus Arth. var. steironematis (Arth.) J.J.Davis (0, I), rust. Conn. to Colo. and S. Dak. (1) N. Dak. (2).

TRIENTALIS (PRIMULACEAE)

TRIENTALIS BOREALIS Raf., STARFLOWER (1). Perennial herb of the Northeastern and Central States, sometimes grown in wild gardens and useful to wildlife. Other spp. (2).

Cylindrocarpon magnusianum (Sacc.) Wr., leaf spot. Mass., Mich., N. Y., Wis. (1); Calif. (2)
Puccinia karelica Tranz. (0,I), rust. N. Y., Wis. (1); Alaska (2). II and III on Carex spp.
Septoria increscens Pk., leaf spot. Me., Mich., N. Y., Vt., Wis. (1); Calif. (2).
Synchytrium aureum Schroet., leaf gall. Pa. (1).
Tuburcinia trientalis Berk. & Br., leaf & stem smut. Ore., Wash., Alaska (2).

PYROLACEAE*

CHIMAPHILA

CHIMAPHILA MACULATA (L.) Pursh (1) and C. UMBELLATA (L.) Nutt. (2), the latter in several geographic vars. Evergreen woodland herbs, (1) in the Eastern and North Central States, (2) nearly throughout the U. S.; sometimes grown in wild gardens.

Mycosphaerella chimaphilina (Sacc.) House, leaf spot. N. Y., Pa.,

* Sometimes placed as a tribe in Ericaceae

CHIMAPHILA cont.

Ore., Wash. (2). May not be distinct from Sphaerella chimaphilae Ell. & Ev., also published as Mycosphaerella c. Ell. & Ev., [Povah], reported in Del. (2) earlier.

Pellicularia filamentosa (Pat.) Rogers, on leaves. Mass. (1)

Pucciniastrum pyrolae (Pers.) Schroet. (II,III), rust. N. Y. to N. Car., Tenn., and Wis. (1); N. Y., Pa., Wis., also Calif., Mont., Oreg., Wash. (2)

Septoria chimaphilae Ell. & Ev., leaf spot. Del. (1)

Stigmatea pyrolae (Fr.) Schroet., on leaves. N. Y. (2)

MONESES (PYROLACEAE)

MONESES UNIFLORA (L.) Gray, WOOD-NYMPH. Evergreen herb of woodlands in northern U. S., sometimes grown in wild gardens.

Chrysomyxa pyrolae (DC.) Rostr. (II,III), rust. Colo., Me., Mich., Mont., N. Mex., Wash., Wyo., Alaska. O and I on Picea spp.

PYROLA (PYROLACEAE)

PYROLA spp., SHINLEAF, WINTERGREEN.* Evergreen herbs of dry woodlands or bogs in northern U. S., and at high elevations southward, sometimes grown in wild gardens. Representative spp.: P. ASARIFOLIA Michx. (1), P. ELLIPTICA Nutt. (2), P. ROTUNDIFOLIA L. var. AMERICANA (Sweet) Fern. (3), P. SECUNDA L. (4); others (5).

Botrytis cinerea Pers. ex Fr., leaf blight. Md. (3)

Chrysomyxa pyrolae (DC.) Rostr. (II,III), rust. General from Me. to Md., Iowa, and Minn., and in the West from Mont. to N. Mex., Calif., and Alaska (1,3,3,4,5). O and I on Picea spp.

Mycosphaerella chimaphilae Ell. & Ev. [Povah], leaf spot. Mich. (4). Sphaerella isariphora (Desm.) De N. also is reported in Colo. (4).

Ovularia pyrolae Trel., leaf spot. Wis. (2,3).

Phyllosticta pyrolae Ell. & Ev., leaf spot. Wis. (2); Del., Mont. (3)

Pucciniastrum pyrolae (Pers.) Schroet. (II,III), rust. General in the West from N. Dak. to Colo., Calif., and Alaska; also Conn. to Wis. (1,2,3,5).

Ramularia pyrolae Trel., leaf spot. Wis. (3)

Septoria pyrolae Ell. & Martin, leaf spot. Mich. (4).

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* See also Gaultheria (Ericaceae)

RANUNCULACEAE

ACONITUM

ACONITUM spp., MONKSHOOD, as A. FISCHERI Reichb., AZURE M. (1); A. NAPELLUS L., ACONITE (2); other spp. (3). Hardy perennial herbs, introduced and native, grown for ornament or (chiefly in Europe) for the alkaloid aconite.

Erysiphe polygoni DC., powdery mildew. N. Y., W. Va. (1); Tex. (3)
Heterodera marioni (Cornu) Goodey, root knot. N. Y., Vt. (2?).
Phymatotrichum omnivorum (Shear) Dug., root rot. Tex. (3)
Plasmopara pygmaea (Ung.) Schroet., downy mildew. Alaska (3)
Pseudomonas delphinii (E.F.Sm.) Stapp, bacterial leaf spot. Me. (3)
P Puccinia rubigo-vera (DC.) Wint. (0,I), rust. Colo., Alaska (3). The forms on Aconitum have been identified as sp. f. aconiti-rubrae (Lüdi) Mains and sp. f. actaeae-elymi (Mayor) Mains, with II and III on Elymus and Festuca
Rhizoctonia solani Kuehn, root rot. Conn., N. J. (2).
Sclerotinia sclerotiorum (Lib.) DBy., stem rot. Colo. (1)
Sclerotium delphiniii Welch (= S. rolfsii Sacc.), stem rot. Conn., Del., Md., Minn., N. J., N. Y. (2)
Urocystis carcinodes (Berk. & Curt.) Alek. Fisch., leaf & stem smut. Utah (3).
U. sorosporioides Koern., leaf & stem smut. Utah (3)
Uromyces lycoctoni (Kalchbr.) Trotter (0,I,II,III), rust. Calif., Colo., Tex., Utah, Wyo. (3)
Verticillium albo-atrum Reinke & Berth., wilt. N. Y. (1), Mass., ? Ohio (2)

Mosaic -- unidentified virus. N. Y. (2)

ACTAEA (RANUNCULACEAE)

ACTAEA ALBA (L.) Mill. (A. pachypoda Ell.), WHITE BANEBERRY (1); A. RUBRA (Ait.) Willd., RED B. (2); others (3). Perennial herbs of woodlands mostly in the Northeastern and Central States (1, 2), or in the Northwest (3); grown for ornamental berries.

Ascochyta actaeae (Bres.) J.J.Davis, leaf spot. Wis. (2). In Europe also known as Actinonema a. Allesch. and Marssonina a. (Bres.) Magn.
Puccinia rubigo-vera (DC.) Wint. (0,I), rust. N. Y. to Va., Ill., and Minn. (1,2); Wash., Alaska (3). The forms actaeae-agropyri (E.Fisch.) Mains, and actaeae-elymi (Mayor) Mains have been distinguished, with II and III on Agropyron and Elymus.
Ramularia actaeae Ell. & Holw., leaf spot. Iowa, Vt. (1); Colo., N. Mex. (2); Wis. (2,3)

ACTAEA cont.

Urocystis carcinodes (Berk. & Curt.) Alek. Fisch., leaf & stem smut. Pa., W. Va. (1); Ida. (2); Utah (2,3)

ANEMONE (RANUNCULACEAE)

ANEMONE spp. A. Cultivated types, as A. CORONARIA L., POPPY ANEMONE (1); A. JAPONICA Sieb. & Zucc., JAPANESE A. (2); others (3). Mostly exotic perennial herbs, grown under glass for winter bloom (1), or in the open in borders and rock gardens.

Aphelenchoides olesistus (Ritz.-Bos) Steiner, leaf nematode. Conn., ? N. Y. (2). A. ritzemabosi (Schwartz) Steiner & Buhrer. Calif. (2).
Aphelenchus agricola De Man, in roots. Calif. (1).
Botrytis cinerea Pers. ex Fr., collar rot. N. J., Pa. (1,3).
Heterodera marioni (Cornu) Goodey, root knot. Conn. (1); N. Y. (3)
Gloeosporium sp., leaf spot. N. Y. (1)
Phoma regina Fairm., on stems. N. Y. (2)
Phyllosticta anemones Brun., leaf spot. Md. (2)
Sclerotium rolfsii Sacc. (S. delphinii Welch), southern blight. Calif. (1); Md., Mass. (3)
Tranzschelia cohaesa (Long) Arth. (0,I,II,III), rust. Tex. (2)
T. pruni-spinosae (Pers.) Diet. var. discolor (E. Fisch.) Dunegan, (0,I), rust. Calif., Ore. (1). II and III on cultivated Prunus spp.

Mosaic -- unidentified virus. Calif. (2)
Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (1)

ANEMONE spp. B. Native spp., as A. CANADENSIS L. (1), A. CAROLINIANA Walt. (2); A. CYLINDRICA A. Gray (3); A. PATENS L. (including A. ludoviciana Nutt.), AMERICAN PASQUE-FLOWER (4); A. QUINQUEFOLIA L. (5); A. VIRGINIANA L. (6); others (7). Perennial herbs of woodlands or prairies, mostly in the Eastern and Central States and southward; several of ornamental value and grown in wild gardens, (4) useful to wildlife.

Cercospora pulsatillae Clements, leaf spot. Colo. (4)
Cercosporella filiformis J.J.Davis, leaf spot. Wis. (4)
Didymaria didyma (Unger) Pound, leaf spot. Iowa, Mich., Wis. (1,3, 6).
Entyloma ranunculi (Bon.) Schroet., white smut. Wis. (5)
Erysiphe polygoni DC., powdery mildew. Ill., Iowa, N. J., N. Dak., Wis. (1); Mich., Minn. (6); Ill., Ind. (7).
Phoma anemone Kauff., on stems. Fla. (6)
Phyllosticta anemonicola Sacc. & Syd., leaf spot. Ill., Mich., Wis. (1); Ill., Nebr., Wis. (3); Md., Mich., Va. (7).

ANEMONE cont.

Phyllosticta ellisiana Lambotte & Fautrey. Vt. (6)

Plasmopara pygmaea (Unger) Schroet., downy mildew. N. Y. to Ill. and N. Dak. (1); Iowa (2); Mass. to Ill. and Wis. (5); Ill., N. Y., Wis. (6); S. Dak., Mont. (7)

Puccinia gigantispora Bub. (0,I,III), rust. Colo., Ill., N. Dak., Wis. (3); Colo., Ida., Mont., Wyo., Alaska (7)

P. magnusiana Koern. (0,I). N. Y. to Kans. and N. Dak. (1). II and III on Phragmites communis.

P. anemones-virginianae Schw. (III). Mich., N. Y. (1); Conn. to Nebr. and N. Dak. (3); Me. to Miss. and N. Dak. (6). Correlated with the preceding.

P. rubigo-vera (DC.) Wint. (0,I). Frequent (5), occasional (1,2, 5,6,7) from N. Y. to Tex., Colo., and Mont. The vars. agropyri (Eriks.) Arth. and agropyrina (Eriks.) Arth., and the f. sp. canadensis, dakotensis, and anemonicola of Mains have been distinguished, all with II and III on Agropyron, Elymus, Hordeum, or Hystrix.

P. pulsatillae Kalchbr. (III). Colo., Iowa, N. & S. Dak., (4); Alaska (4,7); Ore. (7). Correlated with the preceding

P. retecta Syd. (III). Colo., Alaska (7).

P. vesiculosa Schlecht. (III). Alaska (7)

Pyrenophora ampla Syd., on leaves and stems. Utah (7)

Ramularia ranunculi Pk., leaf spot. N. Y. (1); Wis. (3).

Septoria anemones Desm., leaf spot. Ill., Iowa (1); Miss., Tex. (2); Wis. (3,5); Ill., Miss., Mo., Vt., Wis. (6)

S. cylindrica Ell. & Ev. Mont. (3); Va. (6).

S. punicea J.J.Davis (Phleospora anemones Ell. & Kell.). Nebr. (3); Mass., Mich., Miss., Wis. (6); Kans. (7).

Stagonospora pulsatillae Vest., on stems. Alaska (7)

Synchytrium anemones (DC. ex Fr.) Wor., leaf gall. Iowa, Minn. (3); Del., Iowa, Mass., Mich., Vt., Wis. (5); Vt. (6)

Tranzschelia cohaesa (Long) Arth. (0,I,II,III), rust. Tex. (7)

T. pruni-spinosae (Pers.) Diet. var. typica (E.Fisch.) Dunegan (0, I). Kans., La., Nebr., Tex. (2); Vt. to Ala., Iowa and Wis. (5). II and III on native Prunus spp.

T. fusca (Pers.) Diet. (0,III). Mass. to Va., Ill., and Minn., also Calif., Ore. (5); Ida., Ore., Utah, Wash., Wyo. (7). Correlated with the preceding.

T. suffusca (Holw.) Arth. (0,III). Colo., Iowa, Mont., N. & S. Dak., Alaska (4)

T. tucsonensis (Arth.) Diet. (0,I,II,III). Ariz. (7)

Urocystis anemones (Pers.) Wint., leaf & stem smut. Minn., N. Y., Wis., (1); Kans., Tex. (2,7); Colo., N. Mex., N. Dak. (4); Me. to Del., Iowa, and Wis. (5); Colo., Alaska (7)

U. sorosporioides Koern. Alaska (7)

ANEMONELLA (RANUNCULACEAE)

ANEMONELLA THALICTROIDES (L.) Spach, RUE ANEMONE. Perennial herb of woodlands throughout the Eastern and Central States, sometimes grown in wild gardens.

Cercospora caulophylli Pk., leaf spot. Mo.
Puccinia rubigo-vera (DC.) Wint. (0,I), rust. Ind., Iowa, Mo.
Urocystis anemones (Pers.) Wint., leaf & stem smut. N. Y.

AQUILEGIA (RANUNCULACEAE)

AQUILEGIA spp., COLUMBINE, as A. CAERULEA James (1), A. CANADENSIS L. (2), A. VULGARIS L. (3), other spp. (4). Perennial herbs, native (1,2, and others), or originally of Europe and Asia (3 and others), extensively hybridized in cultivation and commonly grown for ornament.

Ascochyta aquilegiae (Rabh.) Hoehn. (Marssonina a. (Rabh.) Lind), leaf spot. Ill., Wis. (2); Conn., Md., Iowa, N. J., N. Y., Pa., Tex., Wis., Alaska (3,4). Various names as Gloeosporium aquilegiae Thuem., Phyllosticta a. Roum. & Pat., and Actinonema a. Grove have been applied to this; probably also includes Phyllosticta aquilegiae Tehon & Daniels.
Botrytis cinerea Pers. ex Fr., gray-mold blight. Va. (3).
? B. streptothrix (Cke. & Ell.) Sacc. Conn. (3)
Cercospora aquilegiae Kell. & Swing., leaf spot. Kans. (2,3); Ore. (4)
Erysiphe polygoni DC., powdery mildew. Utah, Wyo. (1); Ill., Ind., N. Y., Ohio, Pa., Wis. (2); N. J. (3); Alaska (4)
Gloeosporium aquilegiae Thuem. See Ascochyta a.
Haplobasidium pavoninum Hoehn., leaf spot. Alaska (3).
Heterodera marioni (Cornu) Goodey, root knot.
Kellermania alpina Ell. & Ev., on stems. Colo. (1)
Mycosphaerella caerulea (Ell. & Ev.) Tracy & Earle, on stems. Colo., (1). Sphaerella aquilegiae Ell. & Gall. (? M. pachyasca (Rostr.) Vest.), on leaves and stems. Mont. (4)
Phoma sp., stem rot. Pa. (3)
Phyllosticta aquilegiae Roum. & Pat. (1883), Tehon & Daniels (1925). See Ascochyta a.
?P. aquilegicola Brun., stem rot. Wash. (3). Considered a synonym of Ascochyta aquilegiae by some authors.
Phymatotrichum omnivorum (Sheer) Dug., root rot. Tex. (2)
Puccinia rubigo-vera (DC.) Wint. (0,I), rust. Colo., N. Mex., Ore., Utah, Wyo. (1); Calif., Colo., Ida., Mont., Ore., Wash., Wyo. (4). Forms on Aquilegia are referred to var. agropyri (Ericks.) Arth. by Arthur, or to sp. f. aquilegiae by Mains. II and III on various native grasses.

AQUILEGIA cont.

Pythium mamillatum Meurs, root rot. ? Calif. (1)
Rhabdospora clarkeana Sacc., on stems. N. Y. (2)
Rhizoctonia solani Kuehn, root rot, damping off. Ill. (3)
Sclerotinia sclerotiorum (Lib.) DBy., stem rot, wilt. Del., Ohio, Pa., Tex. (3)
Sclerotium rolfsii Sacc. (S. delphinii Welch), collar rot. Del. (2,3); N. J., Va. (3)
Septoria aquilegiae Penz. & Sacc., leaf spot. Ind., Mich., N. Y., Ohio, Vt., Wis. (2); Mich., Ohio, Va., Wis. (3); Conn. (4).
S. longispora Overh. Pa. (2).
Urocystis sorosporioides Koern., leaf & stem smut. Utah (1,4).

Mosaic -- unidentified virus. Iowa, Kans. (1); Iowa, N. Y. (2); N. J. (3)

CALTHA (RANUNCULACEAE)

CALTHA PALUSTRIS L., MARSH-MARIGOLD (1); other spp. (2). Perennial herbs of bogs in eastern N. America (1) or in the far West (2); sometimes grown in wild gardens, and furnish food for wildlife.

Cercospora calthae Pk. & G.W.Clint., leaf spot. Wis. (1)
Cylindrosporium sp., leaf spot. N. Y. (1)
Erysiphe polygoni DC., powdery mildew. Mich., Ohio, Wis. (1)
Fabraea rousseauana Sacc. & Bomm., leaf spot. Wis. (1); Calif. (2)
Puccinia areolata Diet. & Holw. (0,I,II,III), rust. Calif., Colo., Wash., Alaska (2)
P. gemella Diet. & Holw. (III). Calif., Ida., Mont., Ore., Wash., Alaska (2). Correlated with the preceding.
P. calthae [Grev.] Lk. (0,I,II,III). N. Y. to N. J., Ind., and N. Dak. (1).
P. calthicola (calthaecola) Schroet. (0,I,II,III). N. Y. to Iowa and Minn. (1)
P. treleasiana Paz. (III). Colo., Nev., Utah, Wash., Wyo. (2). Correlated with the preceding.
Ramularia calthae Lindr., leaf spot. N. Y., Wis. (1).
Synchytrium aureum Schroet., leaf gall. Wis. (1)

CIMICIFUGA (RANUNCULACEAE)

CIMICIFUGA RACEMOSA (L.) Nutt., BLACK COHOSH (1). Perennial herb of woodlands in the Eastern and Central States; may be grown in wild gardens but other spp. (2) of Europe or e. Asia are more frequently cultivated.

Ascochyta actaeae (Bres.) J.J.Davis, leaf spot. Conn., N. Y. (1)

CIMICIFUGA cont.

Ectostroma afflatum (Schw.) Fr., leaf spot. Va. (1)
Heterodera marioni (Cornu) Goodey, root knot. N. J. (2)
Puccinia rubigo-vera (DC.) Wint. (0,I), rust. N. Y., N. Car., Ohio, Pa., Tenn., Va., W. Va. (1). Referred to var. agropyrina (Eriks.) Arth. with II and III on various native grasses.
Urocystis carcinodes (Berk. & Curt.) Alek. Fisch., leaf & stem smut, N. Y., N. Car., Ohio, Pa., Tenn., Va.

CLEMATIS (RANUNCULACEAE). See PDR 25: 76-77. 1941

COPTIS (RANUNCULACEAE)

COPTIS GROENLANDICA (Oeder) Fern. (C. trifolia Amer. auths.), GOLDTHREAD (1); other spp. (2). Small perennial herbs of bogs and woods in the Northern States, sometimes grown in wild gardens.

Mycosphaerella coptis (Schw.) House, leaf spot. Me., N. Y., Vt. (1). Usually associated with Septoria coptidis.
Phyllosticta helleboricola Massal. var. coptidis Sacc. & Scalia, leaf spot. Alaska (2).
Septoria coptidis Berk. & Curt., leaf spot. Mich., N. Y., Vt., Wis. (1); Ida., Wash., Alaska (2)
Vermicularia coptina Pk., leaf spot. N. Y. (1)

DELPHINIUM (RANUNCULACEAE)

DELPHINIUM spp., LARKSPUR. Numerous perennial and a few annual herbs, mostly introduced and grown for ornament; also many native spp., some of ornamental value. D. AJACIS L., ROCKET L. (1), of Europe is the most commonly cultivated annual type; the perennial larkspurs of gardens are cultigens, sometimes collectively called D. CULTORUM Voss or D. HYBRIDUM Hort. (2), are derived mainly from D. CHEILANTHUM Fisch., GARLAND L., and D. ELATUM L., CANDLE L., and also D. GRANDIFLORUM L., BOUQUET L. (3), all of Asiatic or European origin; the native spp. most used in cultivation are D. CARDINALE Hook., SCARLET L. (4), and D. NUDICAULE Torr. & Gray, ORANGE L. (5) of California; other spp. (6).

Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn, crown gall. Wash. (2)
Ascochyta aquilegiae (Rabh.) Hoehn., leaf spot. Conn. (2)
Botrytis cinerea Pers. ex Fr., gray-mold blight, bud rot. N. Y. (1); Conn., Mass., Miss., N. Y., W. Va., Wis. (2)
Cercospora delphinii Thuem., leaf spot. Colo., Mo. (6)
Cercosporella herpotrichoides Fron, on stems. Ida., Ore., Wash.

DELPHINIUM cont.

Diaporthe arctii (Lasch) Nits., stem canker. Md., N. Y., N. Car., Ohio, Pa. (1); N. Y. (2)

Didymella delphinii Earle, on stems. Nev. (6).

Diplodina delphinii ? Dodge (nom. nud.), collar rot, ? leaf spot. Calif., N. Y. (2,3)

Ditylenchus dipsaci (Kuehn) Filip., leaf & stem nematode. Ore., Wash. (6)

Entyloma winteri Linhart, white smut. Calif. (6).

E. wyomingense Zundel. Wyo. (6).

Erwinia carotovora (L.R.Jones) Holland, bacterial collar rot. Calif., N. Y. (1,2)

E. phytophthora (Appel) Bergey et al., foot rot, blackleg. Calif., N. Y. (1,2); Minn. (2).

Erysiphe cichoracearum DC., powdery mildew. Mass., Minn., N. Y., Wash. (2)

E. polygoni DC. Mich. (1); general (2,3), but some vars. derived from (3) are resistant; also on native spp. in their range.

Fusarium oxysporum Schlecht. f. delphinii ? Dodge, stem canker, wilt. N. Y. (2,3). A similar disease attributed to Fusarium spp. is reported in Ariz., Fla., Mass., Ohio, and Wash. (2)

Heterodera marioni (Cornu) Goodey, root knot. Ariz., N. J., N. Y., Va., Wash. (2)

Mycosphaerella delphiniicola Earle, on stems. Colo. (6)

Ovularia delphinii Solheim, leaf spot. Wyo. (6)

Phoma sp., stem canker. Conn., N. J., N. Y. (2).

P. delphiniicola Tracy & Earle, on stems. Colo. (6).

Phyllosticta sp., leaf spot. N. Y. (2).

P. delphinii Clements. Colo. (6).

Phymatotrichum omnivorum (Shear) Dug., root rot. Tex.

Phytophthora sp., stem rot. Minn. (3)

Pratylenchus pratensis (De Man) Filip., root nematode.

Pseudomonas delphinii (E.F.Sm.) Stapp, bacterial leaf spot, "black disease" (in part). Me. to Va., Mo., and Minn.; Pacific Coast States (2,3).

Puccinia delphinii Diet. & Holw. (III), rust. Calif. (6)

P. rubigo-vera (DC.) Wint. (0,I). Nebr. to N. Mex., Calif., and Wash. on various native spp. Assigned to vars. agropyri (Eriks.) Arth. and agropyrina (Eriks.) Arth. by Arthur; to sp. f. delphinii by Mains, with II and III on Agropyron and other native grasses.

Pythium aphanidermatum (Edson) Fitzp., root rot. Va. (1).

P. ultimum Trow, damping off, root rot. Reported in Calif. and N. Y. (1,2,4); probably cosmopolitan, especially on 2 and 3.

P. vexans DBy. Calif. (1)

Ramularia delphinii Jaap, leaf spot. Calif., Colo., Utah (6).

R. sheldoni Trotter. Colo. (6).

Rhizoctonia solani Kuehn, root rot, damping off. Cosmopolitan (2,3)

Sclerotinia sclerotiorum (Lib.) DBy., stem rot, wilt. Mo. (1); Del., Ill., Mass., Mich., Ohio, Wash. (2,3).

DELPHINIUM cont.

Sclerotium delphinii Welch, collar and stem rot. Kans., N. Car. (1); Mass. to Va., Tex., and Minn.; Calif., Wash. Usually regarded as only a form of the following.

S. rolfsii Sacc., southern blight, collar & stem rot. Tex. (1); N. Y. to Fla., Tex. and Calif.; Hawaii

Septoria delphinella Sacc., leaf spot. Ill. (1); Kans., Wis. (6).

Sphaeromyces delphinii Pk., on stems. Utah (6).

Sphaerotheca humuli (DC.) Burr., var. fuliginea (Schlecht.) Salm., powdery mildew. Calif. (1,6).

Synchytrium aureum Schroet., leaf gall. Iowa (6)

Urocystis sorosporioides Koern., leaf & stem smut. Calif., Ky., Va. (6).

Verticillium albo-atrum Reinke & Berth., wilt. N. Y. (1); Wash. (2).

Volutella sp., stem canker. Md. (2).

"Blacks", black disease -- a confused name, the condition to which it is applied often caused by the cyclamen mite (Tarsonemus pallidus Banks), with or without infection by Pseudomonas delphinii; sometimes associated with virus infection as ring spot and spotted wilt.

Calico -- virus (Marmor aevi Holmes, Delphinium virus 1 K.M.Sm., in part). Calif. (1,2,3); Ida., Wash. (2,3). See also Mosaic

Curly top -- virus (Chlorogenus eutetticola Holmes, Beta virus 1 K.M.Sm.). Calif. (1); ? Wash. (2). Experimental infection of (5) is reported in Calif.

Mosaic -- virus(es). In part = calico (q.v.); in part probably cucumber mosaic virus (Marmor cucumeris Holmes, Cucumis virus 1 K.M.Sm.), reported in Fla. (1); Calif., Ky. (2); also unidentified, in Kans., Mont., Nebr., Pa. (2,3)

Ring spot -- virus (Annulus delphinii Holmes, ? Delphinium virus 2 K.M.Sm., in part). Calif. (2,3). As reported in Ky., Minn., N. Y., and ? Wash. (2) the virus may belong to the tobacco ringspot group (Marmor annularium McK. or Annulus tabaci Holmes, Nicotiana virus 12 K.M.Sm.).

Spotted wilt -- virus (Lethum australiense Holmes, Lycopersicon virus 3 K.M.Sm.). Calif. (1,2,3)

Variegation -- noninfectious, seed-transmitted leaf color anomalies. Calif. (2,3).

Virescence, "greens" -- virus, probably aster yellows. Wash. (2,3). Also observed in Calif. and attributed to the western strain of this virus.

Stunt, witches'-broom -- virus(es). In part aster yellows virus, (western and ? eastern strains) singly or associated with other viruses as calico and ring spot. Ind., N. Y., Wash. (2,3)

Yellows -- virus (Chlorogenus callistephi var. californicus Holmes, Callistephus virus 1A K.M.Sm.). Calif. (1,2,3); Utah, Wash., ? Ida., ? Ore. (2,3). Perhaps also the eastern or typical strain

DELPHINIUM cont.

of this virus as a component of stunt, reported in Conn., Ind, N. J., N. Y. (2)

HELLEBORUS (RANUNCULACEAE)

HELLEBORUS NIGER L., CHRISTMAS-ROSE. Hardy perennial herb of Europe, grown as a garden flower or under glass for winter bloom.

Botrytis cinerea Pers. ex Fr., flower spot. N. J.
Coniothyrium hellebori Cke. & Mass., black leaf spot. Md., N. Y., Ore.
Gloeosporium sp., flower spot. N. J.
Sclerotium delphinii Welch, stem rot. ? N. Y.

HEPATICA (RANUNCULACEAE)

HEPATICA ACUTILOBA DC. and H. AMERICANA (DC.) Ker Gawl (1). Perennial herbs of woodlands throughout eastern N. America; sometimes grown in wild gardens, but other spp. (2), of Europe, are more commonly cultivated.

Colletotrichum hepaticae Pk., on leaves. N. Y., Wis. (1).
Gloeosporium acutiloba Dearn. & House, on fading leaves. N. Y. (1)
Plasmopara pygmaea (Ung.) Schroet., downy mildew. Iowa, N. Y., Wis. (1); Ill., Pa. (2). Also var. fusca (Pk.) J.J.Davis in Wis. and N. Y. (1).
Septoria hepaticae Desm., leaf spot. Mich., N. Car. (1).
Tranzschelia pruni-spinosae (Pers.) Diet. (0,I), rust. Mass. to Md., Tenn., and Minn. (1,2). Only the var. typica (E. Fisch.) Dunegan with II and III on native Prunus spp. is reported here.
Urocystis anemones (Pers.) Wint., leaf and stem smut. N. Y. to Ind., Mo., and Minn. (1); Wis. (2)

HYDRASTIS (RANUNCULACEAE)

HYDRASTIS CANADENSIS L., GOLDENSEAL. Perennial herb of woodlands in the Eastern and Central States, sometimes cultivated for rhizomes used in pharmacy.

Alternaria sp., leaf blight. Mich., N. Y., Ohio
Botrytis sp. (B. hydrastidis Whet., nom. nud.), leaf blight. Conn. to N. Car., Ind., and Wis.; Wash.
Fusarium sp., wilt. Ill., N. Y., Ohio, Wash.
Heterodera marioni (Cornu) Goodey, root knot. Mich., Ohio, Wash.
?Phytophthora cactorum (Leb. & Cohn) Schroet., stem rot. N. Car.

HYDRASTIS cont.

Rhizoctonia solani Kuehn, root rot. N. Car.

Mosaic -- unidentified virus. Conn.

PAEONIA (RANUNCULACEAE)

PAEONIA ALBIFLORA Pallas (1) and P. OFFICINALIS L. (2), PEONY; P. SUFFRUTICOSA Andr., TREE P. (3). Hardy perenniel herbs (1,2) or small shrub (3), widely cultivated for ornament. The common garden peonies are derived chiefly from (1) of e. Asia, to which records without specific designation are referred; also in part from (2) of s. Europe and other spp.; (3) is native to China.

Agrobacterium tumefaciens (E.F.Sm. & Town.) Conn, crown gall. Mich. (1); Md. (2)

Alternaria sp., leaf spot (? secondary). Occasional in Northeastern and Central States (1,2).

Armillaria mellea Vahl ex Fr., root rot. Calif., Iowa, Mich., Ore. (1).

Botrytis spp., blight, bud rot, root rot. General (1,2). Usually referred to B. paeoniae Oud., sometimes to B. cinerea Pers. ex Fr., without distinguishing symptoms; the former perhaps to be regarded as only a physiological race.

Cercospora paeoniae Tehon & Daniels, leaf spot. Ill. (2).

C. variicolor Wint., leaf spot. Pa. to N. Car., Nebr., and Wis. (1).

Cladosporium paeoniae Pass., leaf blotch. General (1,2); Mass. (3). C. herbarum Lk. ex Fr. is occasionally reported, but is probably general, as a secondary invader of leaf and bud necroses. A special form of one or the other of these is perhaps the cause of one kind of anthracnose (stem, leaf, and flower spot) reported in Md., Pa., and probably elsewhere.

Coniothyrium sp. (? C. fuckelii Sacc.), stem canker, wilt. Calif. (3).

Cryptostictis paeoniae Tehon & Daniels, leaf spot. Ill. (2).

Ditylenchus dipsaci (Kuehn) Filip., leaf and stem nematode. Wash. (1); N. J. (2)

Erysiphe polygoni DC., powdery mildew. Tex. (1).

Fusarium sp., root rot, stem rot (? secondary). Colo., Ind., Mo., Nebr., N. J., Okla. (1).

Gloeosporium sp., anthracnose. Ill., N. J. (1); probably this also in Kans., Md., Mass., N. Car., Pa., Va. and elsewhere. See also Cladosporium

Heterodera marioni (Cornu) Goodey, root knot. N. Y. to N. Car., Okla., and N. Dak., also Pacific Coast States, (1,2,3).

Monochaetia paeoniae (Maubl.) Sacc. & D.Sacc., on stems. Md., N. J. (3)

PAEONIA cont.

Pezizella oenotherae (Cke. & Ell.) Sacc., leaf spot. Md., Pa. (1)

Phyllosticta spp., leaf spot. N. J., Pa., Va. [illegible]

P. baldensis Massal, Alaska (1); Pa. (2). [illegible]

P. commonsii Ell. & Ev. N. J. to Va. and Ind.; Okla. (1,2)

Phymatotrichum omnivorum (Shear) Dug., root rot. Ariz., Tex. (1).

Phytophthora cactorum (Leb. & Cohn) Schroet. (P. paeoniae Cooper & Porter), tip blight, crown rot. Conn., Ill., Ind., Kans., Minn., N. J., N. Y., Ohio; probably this also reported as Phytophthora sp. in Me. and Wis. (1,2).

Rhizoctonia solani Kuehn, root and stem rot. Conn., Ill., Md., Minn., N. Y., Pa., Va. (1).

Sclerotinia sclerotiorum (Lib.) DBy., stem rot, wilt. Ill., Me., Md., Minn., N. J., N. Y., Ohio, Okla. (1).

Sclerotium rolfsii Sacc., southern blight. Miss., Tex. (1)

Septoria paeoniae West., leaf spot, ? stem canker. Me., Mich., Minn., N. J., N. Y., Ore., R. I., Wash., Wis. (1). Usually reported as var. berolinensis Allesch., but perhaps not differing from the type.

Thielaviopsis basicola (Berk. & Br.) Ferr., root rot. Conn. (1)

Verticillium albo-atrum Reinke & Berth. (including V. dahliae Kleb.), wilt. Ill., Kans., Md., N. Y., Ohio (1,2).

Mosaic, ring spot -- virus (Paeonia virus 1 K.M.Sm.). Mass. to Va., Kans. and Mich., also Calif. and Wash.

Bud blast -- causes various, often unknown, but only in part Botrytis infection (q.v.); also attributed to root knot, Le Moine disease, and unidentified viruses. General (1,2).

Crown elongation, ? witches'-broom -- cause unknown, virus suspected. Mo., N. J., N. Y., Ohio, Okla. (1).

Le Moine disease, club root -- cause unknown, virus suspected but often confused with root knot (see Heterodera marioni) and perhaps a late phase of this. Ill., Ind., Mich., Minn., Mo., Ohio, Wash. (1).

"Measles", ? anthracnose. See Cladosporium and Gloeosporium.

Witches'-broom -- cause unknown, virus suspected; perhaps same as crown-elongation disease. Md., N. Y., Va. (1).

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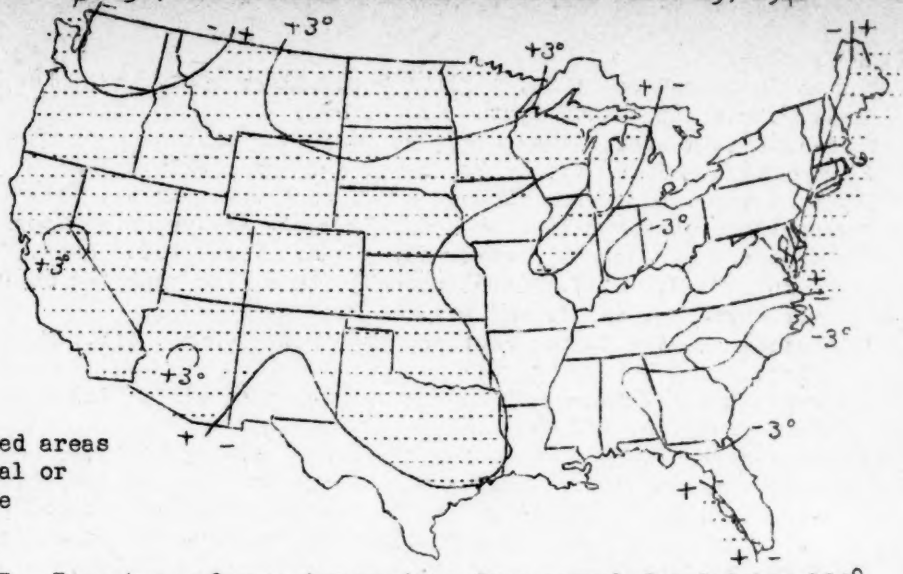
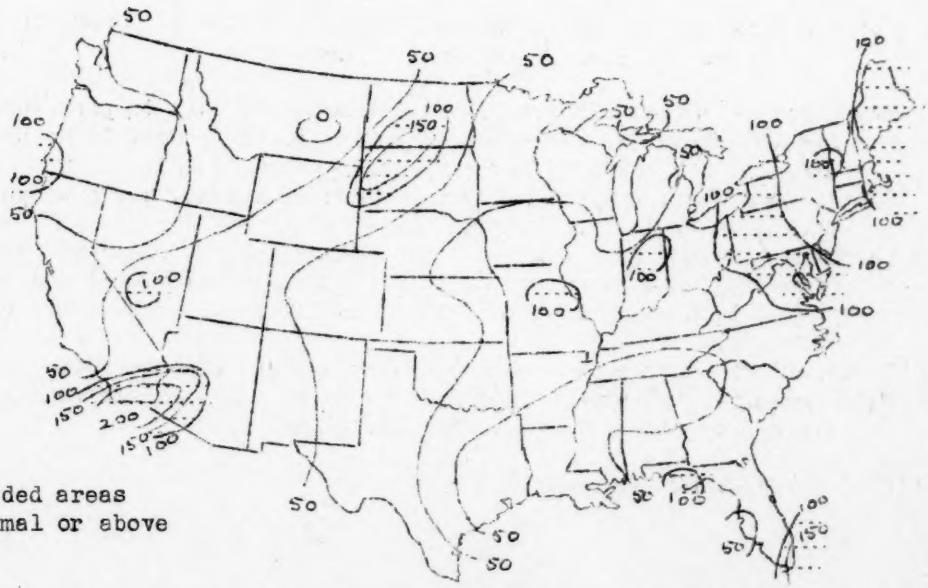


Map I. Departure of mean temperature from normal for October 1948



Map II. Percentage of normal precipitation for October 1948

OCTOBER WEATHER

(From U. S. Department of Commerce, Weather Bureau, Weekly Weather and Crop Bulletin for the week ending November 2, 1948)

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